Guidelines for Student Reports

SPARSE WIDEBAND ARRAYS THROUGH COMPRESSIVE SENSING

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Abstract

In the last years there has been an increasing interest in wideband arrays due to their interesting applications in several contexts including satellite communications, remote sensing, radar systems, and imaging. However, designing wideband antenna arrays (i.e., selecting the displacement of the antennas and their feeding for each frequency) is a much more challenging problem than that of traditional narrowband systems. Indeed, it can be essentially formulated as a set of N different narrowband array problems with a shared geometry.
In this framework, several techniques have been proposed to solve the associated problem, including convex optimization and evolutionary algorithms. However, they are usually concerned only with uniform arrangements, thus yielding to quite heavy and expensive structures. Indeed, the use of sparse layouts, which could yield a significant advantage in terms of costs and weight of the geometry, has not been considered so far for these applications.
Recently, a new set of techniques have been proposed for the design of sparse arrangements. These techniques, which belong to the compressive sensing framework, can in principle be applied to the synthesis of wideband arrangements by taking into account the "multi-task" formulation of the Bayesian Compressive Sensing (MT-BCS). Accordingly, the objective of this work will be that of adapting existing narrowband methodologies based on the MT-BCS to the wideband case, and to validate it.

Reference Bibliography: Evolutionary Optimization and Ultrawideband Antennas [1]-[9]; Evolutionary Optimization [10]-[11].

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